

REMARKS

Claims 16-19, 21-24 and 26-33 are pending in the present application. Claims 1-15 were previously cancelled. Claims 20 and 25 are cancelled herein. Claims 16, 17 and 24 have been amended. Claims 29-33 were previously withdrawn. No new matter has been added. Applicants respectfully request reconsideration of the claims in view of the amendments and the following remarks.

This amendment accompanying a request for continued examination addresses the Examiner's remarks in the Final Action mailed December 3, 2008 and the remarks made in the Advisory Action, mailed April 6, 2009, in response to the arguments made in Applicants' amendment mailed March 3, 2009. Reconsideration is requested.

In the Final Action mailed previously in the parent case, the Examiner asserted that amendments Applicants filed earlier introduce new matter. ("The amendments filed 12/22/2006 and 4/24/2007 are objected to under 35 U.S.C. 132(a) because they introduce new matter into the disclosure.") In the Final Action, the Examiner stated, "It is alleged that the added material not supported by the original disclosure is as follows: In paragraph [0025], as amended on 12/22/2006, the amendment 'such that the notched spacer is thinner along the surface of the substrate, as illustrated in FIG. 1j', is a new matter."

Later, however, the Examiner makes it clear that the objection to the paragraph language is due to the reference to Figure 1j. That is, the Examiner admits at page 12 of the Final Action that the words added to paragraph 0025 by amendment, words which were first presented along with the original filed specification as recited elements in claim 16, are not in fact new matter. The Examiner then maintains that the end of the sentence, referring to "as illustrated in FIG. 1j", is adding new matter. Frankly, Applicants do not understand the Examiner's position.

Applicants have attempted in several responses to explain the proper broad scope of the meaning of the phrase “along the surface of the substrate” as originally presented in claim 16 as filed. However, in one last attempt to advance the prosecution of this application without the additional cost and delay associated with filing an appeal, Applicants have now amended paragraph 0025 to change the reference to Figure 1j. Figure 1j is now described as the structure that results when a portion of the first layer remains on the gate electrode after the isotropic etch, that is, when it is only partially removed, instead of completely removed. The specification originally filed provides support for partial removal of the first layer in original paragraph [0010], which states, “The notched spacer is formed alongside the gate electrode such that a portion of the notched spacer is completely or partially removed along the corner formed between the surface of the substrate and the gate electrode sidewall.”

Further, the drawings are objected to, because it is alleged that amended Figure 1j, filed on 6/24/2008 introduces new matter. The Examiner states:

Figure 1j is objected to, because figure 1j does not depict a notched spacer is thinner along the surface of the substrate, as recited in original claim 16. Figure 1j depicts a notched spacer alongside the gate electrode, such that the notched spacer is thinner at a first portion closer to the surface of the substrate than at a second portion being further from the substrate. Note that the phrase “a notched spacer is thinner along the surface of the substrate” is not synonymous to the phrase “a notched spacer is thinner at a first portion closer to the surface of the substrate than at a second portion being further from the substrate.”

Office Action dated December 3, 2008, Pages 12 and 13.

Applicants respectfully respond that Figure 1j does not contain any new matter. The specification as originally filed contained the following descriptions of the removal of a portion of the first dielectric layer by etch:

Original paragraph [0010] states: “The notched spacer is formed alongside the gate electrode such that a portion of the notched spacer is completely or partially removed along the corner formed between the surface of the substrate and the gate electrode sidewall.”

Original paragraph [0025] states (with emphasis added):

As illustrated in FIG. 1E, *the portion of the first dielectric layer 126 (FIG.1D) located under the notched-spacer masks 130 is removed due to the isotropic etching process, thereby creating a notched spacer.* The width of the notch will be dependent upon the thickness of the first dielectric layer 126 and the notch height may be controlled by varying the etch duration. Furthermore, FIG. 1E illustrates the situation in which the first dielectric layer 126 is removed completely to the gate electrode 122. In other situations, *a portion of the first dielectric layer 126 may remain on the side of the gate electrode 122.* This may be desirable, for example, when it is preferred to control the depth and angle of the implant or to protect the gate electrode 122 or gate dielectric 120 from damage during the etching process or other processes.

While Applicants continue to disagree with the Examiner’s position, and believe that the phrase “a notched spacer is thinner at a first portion closer to the surface of the substrate than at a second portion being further from the substrate” *is* in fact synonymous with “a notched spacer is thinner along the surface of the substrate”, it is nevertheless clear from the above quoted paragraphs that Figure 1j illustrates the structure the original filed specification describes; the structure that results when the removal of the first dielectric layer 127 is partial, and a portion remains on the sidewall of the gate electrode. As is clearly described in the specification, the removal of the first layer by etch may be complete or partial and remove a portion of the first layer. Figure 1j merely illustrates this described structure and is supported by the original disclosure and does not constitute any new matter.

Applicants respectfully request reconsideration and withdrawal of the objection under 35 U.S.C. §112 to Figure 1j, and the withdrawal of the objection to the specification referring to Figure 1j.

Claims 16-28 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. It is alleged by the Examiner that the claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants disagree. Paragraph [0010] states, “The notched spacer is formed alongside the gate electrode such that a portion of the notched spacer is completely or partially removed along the corner formed between the surface of the substrate and the gate electrode sidewall.” Clearly, a notched spacer partially removed along the corner formed between the surface of the substrate and the gate electrode is “thinner along the surface of the substrate.” Removing any portion of the described corner must make the notch (in the notched spacer) thinner. Partially removing a portion of the described corner obviously means that there is a portion left; however, it follows that since there is a portion removed, the notch must be thinner.

The Examiner states:

The recitation of ‘a portion of the notched spacer is completely or partially removed along the corner formed between the surface of the substrate and the gate electrode sidewall’ does not necessarily mean that the notched spacer is thinner along the surface of the substrate. Partially removing a portion of the notched spacer along the corner formed between the surface of the substrate and the gate electrode sidewall can mean that an entire small portion of space is removed along the corner, thus leaving another portion of the spacer, which is not covered by the mask intact. There is certainly no support for the top of the thinner spacer being aligned with the bottom of the mask as depicted in figure 1j.

Office Action dated December 3, 2008, Pages 13 and 14.

While the Applicants respectfully disagree with the Examiner’s position, it appears that in order to advance the prosecution of this application without the need for further delay, an amendment to claim 16 is indicated as the best course of action to obtain protection in a timely

manner. Accordingly, Applicants have amended claim 16 herein to recite additional elements that are supported by the specification as originally filed, specifically the first layer is thinner in the area described in the specification as the corner formed by the gate electrode and the surface of the substrate.

Thus, amended claim 16, and dependent claims 17-23 are supported by the original specification. Applicants respectfully submit that the rejection of claim 16 is thus traversed. Since claims 17-23 depend from claim 16, the same arguments as the independent claim 16 apply to these dependent claims. Therefore, the rejection of claims 17-23 has been traversed.

Claims 16-23 are rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. These rejections are hereby respectfully traversed.

Regarding claim 16, the Examiner states, “The claimed limitations of a ‘thickness of the notched spacer alongside the gate electrode is thinner near the substrate’, as recited in claim 16, are unclear from which element the notched spacer alongside the gate electrode is thinner than.”

Claim 16 is amended herein to address the Examiner’s earlier remarks. As amended, the claim clearly recites features that are definite and distinct. Claim 16 provides that a first portion of the notched spacer has a first thickness and following the etch methods, a notched portion has a second, thinner thickness. Thus, the recitations clearly and distinctly claim the method embodiment of claim 16, and the claim is allowable under §112. Reconsideration and allowance are requested for claim 16. Claims 17-23 depend from and recite additional elements on the allowable method of claim 16, and incorporate the features of claim 16, and these dependent claims are also believed to be allowable. Reconsideration and allowance are therefore respectfully requested.

Claims 16 and 23 have been rejected in the previous Final Action under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 7, 009,264 to Schuegraf, *et al.* (hereinafter "Schuegraf") in view of U.S. Patent No. 5,215,936 to Kinugawa, *et al.* (hereinafter "Kinugawa"). Applicants respectfully traverse these rejections.

The Examiner states, "Schuegraf et al. do not teach performing a first ion implant wherein only the gate electrode and the notched spacer act as masks during the first ion implant, the first ion implant using ions of the first conductivity type. . ." The Examiner continues by stating, "Kinugawa teaches in figure 3C and related text performing a first ion implant wherein only the gate electrode 15 and the spacer 17A act as masks during the first ion implant, the first ion implant using ions of the first conductivity type N in a . . . substrate having a first conductivity type N."

Applicants respectfully submit that amended claim 16 now recites "...performing a first ion implant at an oblique angle to the substrate so as to implant ions beneath the gate electrode wherein the gate electrode and the notched spacer act as masks during the first ion implant, the first ion implant using ions of the first conductivity type;...

Kinugawa does not teach performing at least these features of claim 16. The combination of Kinugawa and Schuegraf, et al. also does not provide at least these features. Accordingly, Applicants conclude that the claim recites elements not disclosed or suggested by either of the relied upon references or the combination proposed by the Examiner, and that claim 16 is now allowable. Reconsideration and allowance are therefore respectfully requested.

Claim 24 is another independent claim amended herein to recite elements including elements similar to those of claim 16 argued above which are also not shown in the combination

of references relied upon by the Examiner. Thus, the rejection is overcome with respect to claim 24 as well. Reconsideration and allowance are requested.

Claims 17 and 18 have been rejected under 35 U.S. C. § 103(a) as assertedly being unpatentable over Schuegraf and Kinugawa as applied to claim 16 above, and further in view of Chen, *et al.* (U.S. Patent No. 6,610,571, hereinafter “Chen”). Applicants respectfully traverse these rejections.

Chen is added to these references for the recited elements of the dependent claims, e.g. the Examiner has asserted that Chen provides the formation of the notched spacer as recited in claim 17, and the particular material as recited in claim 18. Applicants respond that Chen discloses forming an L shaped spacer. There is no notched spacer as claimed and the features recited in claim 17, for example, are clearly not present in Chen, which particularly discloses avoiding removing the first layer of Chen beneath the second layer (referred to as “undercut”) along the substrate. See Figures 11-14 and the related disclosure of Chen at Col. 6 lines 19-40. Chen specially processes the liner oxide (e.g., first layer) to harden it to avoid etching or slow the etch. No notch may be formed as required using the process specifically taught by Chen. The prior art disclosed nowhere depicts a notched spacer. The liner oxide spacer has uniform thickness everywhere depicted in Chen, whether in the prior art drawings or in the improved preferred embodiments (which clearly cannot be notched by etching, as the process prevents it in Chen).

Thus, even if the combination of the three references proposed were made, dependent claims 17 and 18 recite features not present in the relied upon references and are therefore allowable for these reasons.

Claims 17 and 18 are further dependent on claim 16. Claim 16 is, as argued above, allowable over the first two references. Chen cannot provide the missing elements of that rejection and as Applicants submit above, claim 16 is allowable. As a second independent grounds for allowance of claims 17 and 18, these claims depend from and necessarily incorporate the allowable elements of claim 16; thus, by at least the reason of their dependency, the rejection of claims 17 and 18 are traversed. Reconsideration and allowance are requested.

Claims 16 and 22 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,417,084 to Singh, *et al.* (hereinafter "Singh") in view of Kinugawa. Applicants respectfully traverse these rejections.

The Examiner concedes that, "Singh et al. does not teach performing a first ion implant wherein only the gate electrode and the notched spacer act as masks during the first ion implant, the first ion implants using ions of a second conductivity type." Rather, once again, the Examiner points to Kinugawa. As discussed above, Kinugawa does not teach the implant limitations as claimed. Therefore, neither Singh nor Kinugawa teach all of the limitations found in claim 16, therefore, the rejection of claim 16 has been traversed. The rejection of claim 22 is, at least by virtue of its dependency on claim 16 and the incorporation of those allowable features, also traversed. Reconsideration and allowance are requested.

Claims 17 and 19 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Singh and Kinugawa, as applied to claim 16 above, and further in view of Chen. Applicants respectfully traverse these rejections. Chen does not provide the elements of claim 17 as described above, and thus, the addition of Chen to the other references cited also does not obviate claim 17. Claim 19 adds a feature of a particular material to the allowable elements of claim 17 and is also therefore allowable. Reconsideration and allowance are requested.

Further, as a separate grounds for allowance, claims 17 and 19 depend from claim 16, thus, by at least the reason of their dependency, the rejection of claims 17 and 19 are traversed. Reconsideration and allowance are requested.

Claims 20 and 21 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Schuegraf and Kinugawa, or over Singh and Kinugawa, as applied to claim 16 above, and further in view of Applicant Admitted Prior Art (AAPA). Claim 20 is cancelled herein. Claim 21 depends from claim 16, thus by at least the reason of its dependency, the rejection of claim 21 is traversed. Reconsideration and allowance are therefore respectfully requested.

Claims 24, 27 and 28 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Chen in view of Kinugawa.

Chen specifically teaches away from claim 24. “Due to the loss of liner oxide in these regions 54, device isolation and device performance is negatively affected; this loss of liner oxide must therefore be avoided.” (Chen, Column 4, lines 39-42). See Chen Figure 4 below.

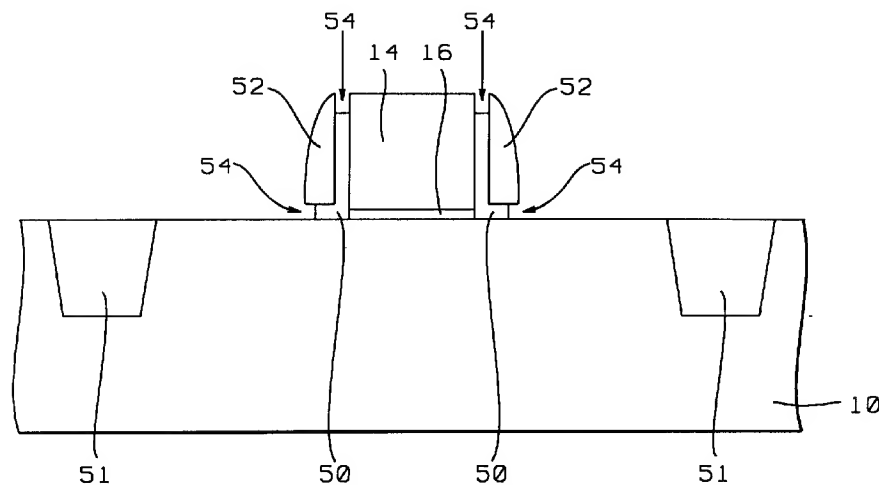


FIG. 4 - Prior Art

Chen, Figure 4.

As can be seen from Figure 4, it is regions 54 that Chen cautions against etching. The oxide liner is thereby formed into an L shape. Therefore, Chen teaches away, in fact cautions against, the modification proposed in the Office Action. A reference may be said to “teach away” from the claimed invention when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the Applicants. This is clearly the case for Chen. Moreover, the shortcomings of Kinugawa have been discussed above and will not be discussed further here. Therefore, neither Chen nor Kinugawa teach all of the claim limitations of claim 24. Further, Chen teaches away from claim 24. Thus, the rejection of claim 24 has been overcome. Reconsideration is therefore respectfully requested.

Since claims 25-28 depend from claim 24, the rejection of claims 25-28 are overcome at least by their dependency on claim 24.

The Examiner responded to the above argument by stating:

Even if Chen cautions against etching regions 54, the examiner does not suggest to modify the etching of regions 54. The Examiner suggests to modify Chen’s device by using ‘a first ion implant is performed after the spacer mask has been removed...’, as taught by Kinugawa. Therefore, it is unclear to the Examiner how Chen teaches away and cautions against, the above modification, as proposed in the Office Action. Furthermore, although the oxide liner is formed into an L shape, this is not the opposite of the notched spacer recited in the claims.

Office Action dated December 3, 2008, Page 16.

Claim 24 is amended herein and as amended clearly recites elements not described by Chen nor the combination proposed, for example at least the elements of isotropically etching the first layer to form a notched spacer in the first layer having a second thickness less than the first thickness wherein the spacer mask acts as a mask, and wherein the etching removes at least a portion of the uncovered first layer along a surface of the substrate and in the corner formed by

the sidewall of the gate electrode and the surface of the substrate, thereby forming a notch in the notched spacer in the corner formed by the sidewall of the gate electrode and the surface of the substrate; are not disclosed. Accordingly, the rejection of claim 24 has been overcome.

Reconsideration is therefore respectfully requested.

Since claims 25-28 depend from claim 24, the rejection of claims 25-28 are overcome at least by their dependency on claim 24. Reconsideration is therefore respectfully requested for these claims.

Claims 25 and 26 have been rejected under 35 U.S.C. § 103(a) as being unpatentable by Chen and Kinugawa, as applied to claim 24 above, and further in view of Applicant Admitted Prior Art (AAPA). Claim 25 is canceled herein. Claim 26 depends from claim 24 and adds further limitations. It is respectfully submitted that dependent claim 26 is allowable by reason of depending from an allowable claim as well as for adding new limitations.

Applicants submit in view of the above, the claims are in condition for allowance. No new matter has been added by this amendment. If the Examiner should have any questions, please contact Mark E. Courtney, Applicants' Attorney, at 972-732-1001 so that such issues may be resolved as expeditiously as possible. Applicants submit herein the required fees of \$810.00 for the Request for Continued Examination and \$490.00 for the two-month extension of time. Should there be any additional fees due, please charge the same, or credit any overpayment, to Deposit Account No. 50-1065.

Respectfully submitted,

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Date

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